THE CLAIMS

What is claimed is:

1. A method comprising:

   swizzling a set of N concurrently active signal lines into a first order to provide a first stage of capacitive and inductive noise cancellation for a first plurality of signal lines of the set; and

   swizzling the set of N concurrently active signal lines again into a second order different from the first order to provide a second stage of further capacitive and inductive noise cancellation for the first plurality of signal lines of the set.

2. The method of Claim 1 wherein a first signal line of the set is adjacent to a first subset of the set of N concurrently active signal lines in the first stage and swizzling the set of N concurrently active signal lines again places the first signal line adjacent to a second subset of the set of N concurrently active signal lines in the second stage, the first subset and the second subset being disjoint.

3. The method of Claim 2 wherein the first signal line of the set is adjacent to a third subset of the set of signal lines in an initial order of the set of N concurrently active signal lines and swizzling the set of signal lines places the

first signal line adjacent to the first subset of signal lines in the first stage, the first subset and the third subset being disjoint.

4. The method of Claim 1 wherein the set of N concurrently active signal lines have a substantially common origin and a substantially common destination.

5. The method of Claim 1 wherein swizzling the set of N concurrently active signal lines comprises reordering N signal lines for concurrently carrying N bits of information in substantially parallel signal tracks on a substantially planar substrate by routing each of a second plurality of said N signal lines from a corresponding pre-swizzling signal track directly to a corresponding post-swizzling signal track, optionally via a substantially parallel planar layer.

6. The method of Claim 5 wherein each swizzling of the set of N concurrently active signal lines is accomplished by inserting a single swizzle cell.

7. The method of Claim 1 comprising swizzling the set of N concurrently active signal lines to provide S stages of capacitive and inductive noise cancellation and optionally providing an additional stage to restore an initial order of the set, wherein each of the N concurrently active signal lines of the set is placed

adjacent to every other signal line of the set in some stage of the S stages, S being

computed from N according to the equation:

$$N^2/2 - (2S+3)N/2 + S + 1 = 0.$$

8. An article of manufacture comprising

    a machine-accessible medium including data that, when accessed by a

    machine, cause the machine to perform the method of Claim 7.

9. An article of manufacture comprising

    a machine-accessible medium including data that, when accessed by a

    machine, cause the machine to perform the method of Claim 6.

10. An article of manufacture comprising

    a machine-accessible medium including data that, when accessed by a

    machine, cause the machine to perform the method of Claim 3.

11. An article of manufacture comprising

    a machine-accessible medium including data that, when accessed by a

    machine, cause the machine to perform the method of Claim 1.

12. The method of Claim 1 wherein the first stage of capacitive and inductive noise cancellation and the second stage of further capacitive and inductive noise cancellation reduce capacitive and inductive noise due to switching within the set of signal lines.

13. The method of Claim 1 wherein concurrently active indicates that each of the N signal lines may be switched in a single transmission cycle.

14. An apparatus comprising:

a set of N signal lines configurable to transmit N bits of information in a transmission cycle, the signal lines being substantially parallel and having a first portion with a first signal line order;

a first swizzle stage of the set of N signal lines having a second portion with a second signal line order, wherein a first signal line of the set is adjacent to a first subset of the N signal lines in said first portion and the first signal line is adjacent to a second subset of the N signal lines in said second portion, the first subset and the second subset being disjoint; and

a second swizzle stage of the set of N signal lines having a third portion with a third signal line order, wherein the first signal line of the set is adjacent to a third subset of the N signal lines in said third portion, the first subset the second subset and the third subset being disjoint.

15. The apparatus of Claim 14 wherein the set of N signal lines have a substantially common origin and a substantially common destination.

16. The apparatus of Claim 14 comprising

   said set of N signal lines in substantially parallel signal tracks on a substantially planar substrate;

   each of a first plurality of the N signal lines being routed from a corresponding signal track in the first portion, according to the first signal line order, directly to a corresponding signal track in the second portion, according to the second signal line order, optionally via one or more substantially parallel planar layers; and

   each of a second plurality of the N signal lines being routed from a corresponding signal track in the second portion, according to the second signal line order, directly to a corresponding signal track in the third portion, according to the third signal line order, optionally via the one or more substantially parallel planar layers.

17. The apparatus of Claim 14 wherein the first swizzle stage of the set of N lines comprises a swizzle cell coupling the first portion with the second portion.

18. The apparatus of Claim 17 wherein the second swizzle stage of the set of N lines comprises a swizzle cell coupling the second portion with the third portion.

19. The apparatus of Claim 14 comprising

a plurality of S swizzle stages to provide capacitive and inductive noise cancellation within the set of N signal lines, wherein each of the N signal lines of the set is placed adjacent to every other signal line of the set in some swizzle stage of the S swizzle stages, S being computed for a particular value of N according to the equation, $N^2/2 - (2S+3)N/2 + S + 1 = 0$; and

an optional final stage to restore an initial order for the set of N signal lines.

20. The apparatus of Claim 14 wherein the third portion of the second swizzle stage places no signal line, of the set of N signal lines, adjacent to one of the same signal lines that they are adjacent to in the second portion of the first swizzle stage.

21. The apparatus of Claim 20 wherein the second portion of the first swizzle stage places no signal line, of the set of N signal lines, adjacent to one of the same signal lines that they are adjacent to in the first portion.

22. The apparatus of Claim 21 wherein the third portion of the second swizzle stage places no signal line, of the set of N signal lines, adjacent to one of the same signal lines that they are adjacent to in the first portion.

23. The apparatus of Claim 14 comprising

a first swizzle cell to reorder the set of N signal lines from the first signal line order into the second signal line order;

a second swizzle cell to reorder the set of N signal lines from the second signal line order into the third signal line order; and

an optional third swizzle cell to restore an initial order for the set of N signal lines.

24. An interconnect comprising:

a set of N active signal lines having an initial order;

means for providing the set of signal lines with a first capacitive and inductive noise cancellation; and;

means for providing the set of signal lines with a second capacitive and inductive noise cancellation in addition to the first capacitive and inductive noise cancellation.

25. The interconnect of Claim 24 further comprising:

means for restoring the initial order of the set of signal lines.

26. The interconnect of Claim 25 wherein the means for restoring the initial order of

the set of signal lines provides the set of signal lines with a third capacitive and

inductive noise cancellation in addition to the first and second capacitive and

inductive noise cancellations.

27. The interconnect of Claim 26 wherein the set of signal lines contains an even

number of signal lines.

28. An article of manufacture comprising:

a machine-accessible medium including data that, when accessed by a

machine, cause the machine to:

insert a first swizzle stage to provide a set of N concurrently active

signal lines having a first signal line order, with a second signal line order,

where in the first signal line order, a first signal line of the set is adjacent to a

first subset of the N signal lines and in the second signal line order the first

signal line is adjacent to a second subset of the N signal lines, the first subset and

the second subset having no signal lines in common; and

insert a second swizzle stage to provide the set of N concurrently

switched signal lines with a third signal line order, where in the third signal line order the first signal line is adjacent to a third subset of the N signal lines, the first subset, the second subset and the third subset having no signal lines in common.

29. The article of manufacture of Claim 28 wherein the second signal line order of the first swizzle stage provides a capacitive and inductive noise cancellation by placing the first signal line adjacent to the second subset of the N signal lines.

30. The article of manufacture of Claim 29 wherein the third signal line order of the second swizzle stage provides an additional capacitive and inductive noise cancellation by placing the first signal line adjacent to the third subset of the N signal lines.

31. The article of manufacture of Claim 30 wherein the first capacitive and inductive noise cancellation and the additional capacitive and inductive noise cancellation reduce capacitive and inductive noise due to switching within the set of N concurrently active signal lines.

32. The article of manufacture of Claim 28 wherein the third signal line order of the second swizzle stage places no signal line, of the set of N concurrently active

signal lines, adjacent to one of the same signal lines that they are adjacent to in the second signal line order of the first swizzle stage.

33. The article of manufacture of Claim 32 wherein second signal line order of the first swizzle stage places no signal line, of the set of N concurrently active signal lines, adjacent to one of the same signal lines that they are adjacent to in the first signal line order.

34. The article of manufacture of Claim 33 further including data that when accessed by the machine, cause the machine to:

   insert a third swizzle stage to restore the set of N concurrently active signal lines to their original order.

35. The article of manufacture of Claim 28 wherein concurrently active indicates that each of the N signal lines may be switched in a transmission cycle.

36. The article of manufacture of Claim 28 further including data that when accessed by the machine, cause the machine to:

   insert a plurality of S swizzle stages to provide capacitive and inductive noise cancellation within the set of N concurrently active signal lines, wherein each of the N signal lines of the set is placed adjacent to every other

signal line of the set in some swizzle stage of the S swizzle stages, S being

computed for a particular value of N according to the equation

$$N^2/2 - (2S+3)N/2 + S + 1 = 0; \text{ and}$$

insert an optional swizzle to restore an initial order for the set of N

concurrently active signal lines.

37. An apparatus comprising:

a set of N concurrently active signal lines, the signal lines being substantially

parallel and having a first signal line order;

a plurality of swizzle cells linking segments of the set of N concurrently

active signal lines, the plurality of swizzle cells transposing near victim signal

lines and far victim signal lines in subsequent segments to facilitate capacitive

and inductive noise cancellation within the set of N concurrently active signal

lines; and

an optional swizzle cell to restore an initial order for the set of N

concurrently active signal lines.

38. The apparatus of Claim 37 wherein concurrently active indicates that each of the

N signal lines may be switched in a single transmission cycle.